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pp. 1029 - 1040

p. 1029

Table 38 Outer morphology Characteristics of Fish Eggs and Hatched Fry

(Legend)

Outer morpohology characteristics

1 : Egg properties - Egg shapes - Oleoglobule numbers

Egg properties **A** : free floating eggs, **B** : chalaza, **C** : egg case, **D** : egg clusters (**B - D** : agglutinated floating eggs)

Egg shapes **A** : spherical, **B** : oval globules, irregular globules, **C** : eggs with one flat end

Number of oleoglobules **A** : no oleoglobules, **B** : one oleoglobule,

C : several oleoglobules

2. Egg membrane structure

A : no particular structure, B : wart-shaped process, C : granulated or globular gelatinous egg skin, D : tortoise shell pattern, E : three-winged process (more than 200 on hemisphere surface), F : same (not more than 100 on hemisphere surface), G : small spines, H : retrograded wrapping threads, I : egg membrane with double structure, J : thick membrane (of the 50 μm order), K : group of small processes at end end of egg

3. Width of egg-surrounding cavity

A : narrow, B : wide

4. Characteristic structure of yolk

A : no cracks, B : there are cracks

5. Characteristic structure of the embryo during the egg period

A : no particular structure, B : breast fins develop, C : dorsal, abdominal fins develop, D : cortex on gill opercule, E : head and trunk parts covered with shell, F : chest, abdominal fins develop

6. Egg diameter range

~ : range, X: minor axis multiplied by major axis of oval, irregular globular egg

7. Oleoglobule diameter

Only the data for single oleoglobule eggs are given

8. Oleoglobule position of the hatched fry

A : front, **B** : center, **C** : rear

9. Number of muscle nodes of the hatched fry

( ) denotes the approximate number of vertebrae in adult fish

Spawning period

( ) indicates the area. For the eggs layed in an aquarium and the like, we show the water temperature at spawning time. In the placenames, Tomioka denotes Amakusa in the Kumamoto Prefecture, Todoro denotes Nobeoka in the Miyazaki Prefecture, Tamanoura denotes the southwestern end of the Goto isles, Mejima denotes the Danjo archipelago, west of Kyushu, and Tsuyazaki denotes the area near Fukuoka City.

Possibility of species determination after fixation

A : Determination of species possible even after fixation, **B** : possible determination of wide taxonomic group, **C** : determination of species possible with eggs at later development stage, **B, C** : possible determination of wide taxonomic group at later development stage of the egg, **D** : determination impossible when fixing, "-" : cannot be determinated due to lack of data

Numbers in the reference table

Consecutive numbers os species in the reference table. The unnumbered species are not included in the reference table. The items described as belonging to the main text refer to the items recorded for the first time in the present atlas.

Reference numbers

They are numbers of references with descriptions related to the outer morphology. We indicate mainly the references in which the plates are most adequate.

Miscellaneous

? : no data

Unknown species I : morphology resembles that of eggs whose ascription is certain

Unknown species II : no resembling species

"0" in front of a fish species name denotes a newly described species, "Δ" denotes a species whose name has been revised, and X (appearing as ✣ in the printed text : translator) a species not described in the reference table

p. 1030

(keys used in translation by translator) :

a. name of fish species b. characteristics of the outer morphology
c. spawning season d. possibility of species determination after fixation
e. reference table number f. reference number
g. 53 - 55 from anus to front h. about i. 20 and several more

j. (on p. 1030 of original) Takeshi (or "Tsuyoshi" ?) HAYASHIBARA (1986) : Utsubo no Tamago Hassei to Zenki Chigyo (The generation of moray eggs and the first-stage fry), Collected summaries of the 1986 Spring Convention of the Japanese Society for Scientific Fisheries, Japanese Society for Scientific Fisheries

k. (on p. 1032 of original) Toshisaku HAMAMOTO, Katsumi NOSAKA, Saburo MANABE, Ko KASUGA (1986) : Yaitohata *Epinephelus salmonides* (Lacépède) no Tamago Hassei to Shichigyoki ni okeru Keitai Henka [Egg generation and the morphological changes in the juvenile - fry period of Yaitohata *Epinephelus salmonides* (Lacépède)], Showa 61 nendo Nihon Gyoruigakkai Nenkai Koen Yoshu (Collected summaries of the 1986 annual meeting of the Japanese Ichthyological Society)

l. (p. 1033 of original) Toshisaku HAMAMOTO, Shigeru KUMAGAI, Saburo MANABE, Ko KASUGA (1985) : Fedai no Tamago Hassei to Shichigyoki ni okeru Keitai Henka (Egg generation and morphological changes at the juvenile - fry period of Fe sea bream) Showa 60 nendo Nihon Gyoruigakkai Nenkai Koen Yoshu (Collected summaries of the 1985 annual meeting of the Japanese Ichthiological Society). Japanese Ichthiological Society

m. (p. 1034 of original) Yoichi TANAKA, Mitoshi SHIOHARA, Takuji OYAMA, Ichiro OZAKI, Masatoshi MORIYA (1985) : Suisonai de kansatsu sareta Kudagonbe no Sanran Shusei to Tamago oyobi Shigyo (The spawning habits, the eggs and juveniles of Kudagonbe observed in water tanks), same reference as in l. above

n. (p. 1034 of original) Yoichi TANAKA, Mitoshi SHIOHARA, Masamichi HAYASHI, Ken FURUKAWA, Sadakazu HATTORI (1985) : Suisonai de kansatsu sareta Sumitsukigonbe no Sanran Shusei to Tamago yo Shigyo (The spawning habits, the eggs and juveniles of Sumitsukigonbe observed in water tanks), same reference as in l. above

Translator's preliminary remark about the fish names listed in the translation

The translation of the very great number of fish names appearing in atlas excerpt submitted for translation was done on the basis of the limited Japanese ichthyologic references immediately available to the Translation Bureau in Ottawa. Unavoidably, some of the above fish names could not be translated, and were therefore merely transliterated instead. It does however appear from the submitted copy of the atlas page 1029, in which is seen the right-hand edge of p. 1028, that the scientific names of the fish listed in the pages submitted for translation, are in fact given elsewhere in the very same atlas. It goes without saying that the requester should refer to these given (and probably numbered) scientific names to obtain the complete and final information he may require.

Clupeida

1. Urume sardine / *Etrumeus micropus* Temminck & Schelegel
2. Sardine

0 3. Pilchard

4. Gizzard shad
5. Hira herring / *Ilisha elongata* Bennett
6. Anchovy

D 7. Maetsu / true etsu (etsu = *Coilia mystus* Linné)

8. Tsumarietsu / tsumari etsu (etsu = *Coilia mystus* Linné)
9. Oki sardine
10. Okuchisaito
11. Nan'yo gizzard shad

Anguillida

12. Pike conger
13. Moray
14. Hydrophiidae sp. 1
15. Hydrophiidae sp. 2
16. Hydrophiidae sp. 3
17. Hydrophiidae sp. 4
18. Hydrophiidae sp. 5
19. Hydrophiidae sp. 6
20. Anguillida sp. 1
21. Anguillida sp. 2
22. Anguillida sp. 3
23. Anguillida sp. 4
24. Anguillida sp. 5
25. Anguillida sp. 6
26. Anguillida sp. 7
27. Anguillida sp. 8
28. Anguillida sp. 9

Salmoniformes

29. Nigisu / *Argentina semifasciata* Kishinoyue
30. Kyurieso / Kyuri eso (eso = lizard fish)
31. Horaieso / Horai eso (eso = lizard fish)

Schlegel)

Nezumigisu Order (Nezumigisu = *Gonorhynchus abbreviatus* Temminck &

32. Milkfish / *Chanos chanos* close to *Albula vulpes* Linné

Myctophida

D 33. Hime (II. A sp.1) / *Aulopus japonicus* Günther

34. Akaeso ? (Lizard fish family sp.2) / "red" lizard fish

35. Okieso ? (Lizard fish family sp.4) / oki lizard fish

0 36. Maeso *Saurida undosquamis* Richardson

37. Wanieso ? (Lizard fish family sp.3 (close to 36.)

38. Tokageeso (close to 36.) Tokage ("lizard") lizard fish

39. Lizard fish family sp. 1

40. Lizard fish family sp. 5

41. Tokageesolike eggs sp. 1

42. Tokageesolike eggs sp. 2

X 43. Tenagamizutengu

44. Lantern fish order sp. 1

45. Lantern fish order sp. 2

Belonida

46. Hemiramph flying fish / *Oxyporhamphus micropterus micropterus*

0 47. Idaten flying fish ? / Cuvier & Valenciennes

0 48. Hagoromo flying fish ?

49. Exocoetidae sp.

Syngnathida

50. Aoyagara close to 51.

51. Akayagara *Fistularia petimba* Lacépède

X 52. Sagifue *Macrorhamphosus scolopax* Linné

Gadida

53. Alaska pollack *Theragra chalcogramma* Pallas

0 54. Ezoisoainame ?

0 55. Etohikidara (Itohiki codfish) ?

56. Codfish order sp.1

57. Codfish order sp.2

58. Codfish order sp.3

Ashiro order (Ashiro = *Otophidium asiro* Jordan & Fowler)

59. Carapidae sp. /Temminck & Schlegel

60. Itachi fish ? (Itachi fish family sp.) *Brotula multibarbata*

Lophiida

61. Ki frogfish ? (Lophiidae sp.) p. 1032

62. Antennariidae sp. / *Antemarius tridens* Temminck & Schlegel

63. Hanaokoze (close to 62.) (*Histrio*)

Berycida

0 64. *Beryx splendens* Lowe

X 65. Pinecone fish *Monocentris japonica* Houttuyn

Akamanbo order (Akamanbo = *Lampris regius* Bonnaterre

0 66. Sakekajira

67. Burinde fish genus sp. ? *Trachypterus iris* Walbaum

Zeida

X 68. Dory *Zeus japonicus* Cuvier & Valenciennes

Percida

0 69. Gray mullet *Mugil cephalus* Linné

0 70. Japanese mullet

0 71. Sesuji mullet

72. Akakamasu

73. Sea bass *Lateolabrax japonicus* Cuvier & Valenciennes

X 74. Hotarujako / *Acropoma japonicum* Günther

X 75. Ao grouper (close to *Epinephenus septemfasciatus* Thunberg)

0 76. Kiji grouper (close to *Epinephelus fario*)

X 77. Nominokuchi / *Epinephelus fario* Thunberg

X 78. Hitomi grouper

X 79. Yaito grouper

0 80. Kingyo hanadai

0 81. Sakura sea bream / *Sacura margaritacea* Hilgendorf

0	82.	Kintoki sea bream / *Priacanthus macracanthus* Cuvier & Valenciennes
	83.	Shiro gisu (gisu = *Pterothrissus gissu* Hilgendorf
	84.	Ao gisu ? (Ya gisu ?)
0	85.	Moto gisu
0	86.	Akaama sea bream / *Branchiostegus japonicus japonicus* Houttuyn
	87.	Takabe Labracoglossa argentiventris ?
X	88.	Sugi *Rachycentron canadus* Linné
	89.	Yellowtail *Seriola quinqueradiata* Temminck & Schlegel
0	90.	Hiramasa *Seriola aureovittata* Temminck & Schlegel
	91.	Horse mackerel *Trachurus trachurus* Linné p. 1033
X	92.	Maru horse mackerel / *Decapterus maruadsi* Temminck & Schlegel
X	93.	Moro
X	94.	Me horse mackerel / *Selar crumenophthalmus* Bloch
X	95.	Aokamuro
	96.	Dorado *Coryphaena hippurus* Linné
X	97.	Hiiragi / *Lirognathus equulus* Forskål
	98.	Daimyosagi / *Gerres japonicus* Bleeker
X	99.	Nibe *Nibea mitsukurii* Jordan and Snyder
0	100.	Koichi
	101.	Shiroguchi *Argyrosomus argentatus* Houttuyn
X	102.	Onibe close to *Argyrosomus argentatus* Houttuyn
	103.	Fusei
	104.	Ki croaker
	105.	Kandari
	106.	Mebutokandari /Temminck & Schlegel
Δ	107.	Umihigoi (Mullidae sp. 2 ?) *Pseudupeneus chrysopleuron*
Δ	108.	Mullet (*Upeneus bensasi* Temminck & Schlegel ? (Mullidae sp. 1)
X	109.	Himetsubame fish
	110.	Opaleye *Girella punctata* Gray
	111.	Opaleye genus sp.
X	112.	Fedai *Lutjanus rivulatus* Cuvier & Valenciennes
X	113.	Tatefue sea bream
0	114.	Yokofue sea bream *Lutjanus erythropterus* Bloch
0	115.	Yosujife sea bream
0	116.	Yokosujife sea bream
	117.	Grunt *Parapristipoma trilineatum* Thunberg

0	118. Koshodai	*Plectorhynchus cinctus* Temminck & Schlegel
X	119. Korodai	*Plectorhynchus pictus* Thunberg
0	120. Setodai	*Hapalogenys mucronatus* Eydoux & Souleyet
X	121. Himekotohiki	
X	122. Mizo grunt	
0	123. Itotamagashira	
0	124. Itoyoridai	*Nemipterus virgatus* Houttuyn ?
X	125. Kidai	*Taius tumifrons* Temminck & Schlegel
	126. Chidai sea bream	*Evynmis japonicus* Tanaka
	127. Red sea bream	*Chrysophrys major* Temminck & Schlegel p. 1034
X	128. Hedai sea bream	*Thabdosargus sarba* Forskål
	129. Black porgy	*Mylio macrocephalus* Basilewsky
	130. Kichinu	(close to 129.)
0	131. Meichidai	Gymnocranius griseus Temminck & Schlegel
X	132. Hamafuefuki	*Lethrinus choerorhynchus* Bloch & Schneider
	133. Itofuefuki	(close to 132.)
0	134. Shirakodai	*Chaetodon nippon* Steinbacher & Döderlein
	135. Kinchakudai	(close to *Holocanthus imperator* Bloch)
0	136. Yaitoyakko	
0	137. Tosayakko	(close to *Holocanthus imperator* Bloch)
0	138. Tatejimayakko	(close to *Holocanthus imperator* Bloch)
	139. Ishidai	*Oplegnathus fasciatus* Temminck & Schlegel
	140. Ishigakidai ?	*Oplegnathus punctatus* Temminck & Schlegel
X	141. Kudagonbe	
X	142. Sumitsukigonbe	
	143. Takanoha sea bream sp. ?	*Goniistius zonatus* Cuvier & Valenciennes
	144. Agoama sea bream family sp. 1	
	145. Agoama sea bream family sp. 2	/ Cuvier & Valenciennes)
0	146. Akatachi family sp. ?	(close to *Acanthocepola limbata*
	147. Sasanoha wrasse	*Pseudolabrus japonicus* Houttuyn
	148. Ohaguro wrasse	*Duymaeria flagellifera* Cuvier & Valenciennes
	149. Nishiki wrasse	*Thalassoma cupido* Temminck & Schlegel
0	150. Itohiki wrasse	
0	151. Honsomewake wrasse	
	152. Kaminari wrasse	*Stethojulis kalosoma* Bleeker
	153. Kyusen	*Halichoeres poecilopterus* Temminck & Valenciennes

154. Hon wrasse *Halichoeres tenuispinis* Günther
155. Fudai *Leptoscarus japonicus* Cuvier & Valenciennes
Δ 156. Aofudai (I.C. sp. 1) *Scarus ovifrons* Temminck & Schlegel
157 Wrasse group sp. 1
158. Wrasse group sp. 2
159. Wrasse group sp. 3
160. Wrasse group sp. 4
161. Wrasse group sp. 5 p. 1035
162. Wrasse group sp. 6
163. Wrasse group sp. 7
164. Wrasse group sp. 8
165. Wrasse group sp. 9
166. Wrasse group sp. 10
167. Wrasse group sp. 11
168. Wrasse group sp. 12
169. Wrasse group sp. 13
170. Wrasse group sp. 14
171. Wrasse group, 2nd species
Δ 172. Wanigisu (I.C sp.6) *Champsodon vorax* Günther
Δ 173. Wanigisu (*Champsodon vorax* Günther) family sp. (I.C sp. 7)
0 174. Shark sucker *Echeneis naucrates* Linné
X 175. Furai swordfish sp. ?
X 176. Broadbill *Xiphias gladius* Linné
177. Ma (true) mackerel *Trachurus trachurus* Linné
178. Goma mackerel *Pneumatophorus tapeinocephalus* Bleeker
179. Spanish mackerel *Scomberomosus niphonius* Cuvier & Valenciennes
180. Taiwan Spanish mackerel
181. Yokoshima Spanish mackerel *Scomberomosus commerson* Lacépède
X 182. Bonito *Sarda orientalis* Temminck & Schlegel
X 183. Hirasoda *Auxis thazard* Lacépède
X 184. Marusoda *Auxis tapeinosoma* Bleeker
185. Soda skipjack Genus sp. ? (monolipid * No. 105)
Δ 186. Skipjack (soda skipjack genus sp.) *Katsuwonus pelamis* Linné
X 187. Yellowfin tuna

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* translator's note : uncertain; literally "one fat"; same hereafter

X 188. Bigeye tuna

X 189. Albacore ?

X 190. Kuro bluefin tuna *Thunnus thynmus* Linné

191. Hairtail *Trichiurus lepturus* Linné

0 192. Oshiroidachi close to 191.

X 193. Harvest fish *Psenopsis anomala* Temminck & Schlegel

X 194. Dokuroko harvest fish

X 195. Tsumaridokuroko harvest fish

X 196. Kurome sea bream p. 1036

X 197. Hanabira fish *Icticus pellucidus* Lütken

X 198. Kurage fish

X 199. Hosookime sea bream

0 200. Harvest fish *Pampus argenteus* Euphrasen

201. Kurakatetoragisu *Parapercis sexfasciata* Temminck & Schlegel

Δ 202. Stargazer *Uranoscopus japonicus* Houttuyn

X 203. Shimaagi subspecies *Acanthurus triostegus* Linné

Valenciennes)

Scorpionfish (kasago) order (kasago = *Sebasticus marmortus* Cuvier &

204. Kichiji *Sebastolobus macrochir* Günther

205. Lion-fish *Pterois lunulata* Temminck & Schlegel

206. Oni stingfish *Inimicus japonicus* Cuvier & Valenciennes

0 207. Oni stingfish family sp.

0 208. Ha stingfish *Hypodytes rubripinnis* Temminck & Schlegel

209. Flathead *Platycephalus indicus* Linné

0 210. Kumo flathead

211. Gurnet (Triglidae) *Chelidonichthys kumu* Lesson & Garnot

212. Igodakahoderi *Lepidotrigla alata* Houttuyn

213. Togekanagashira close to *Lepidotrigla guentheri* Hilgendorf

X 214. Kanado *Lepidotrigla guentheri* Hilgendorf

X 215. Sokokanagashira close to *Lepidotrigla kishinouyei* Snyder

X 216. Gurnard *Lepidotrigla microptera* Günther

217. Triglidae sp. 1

218. Triglidae sp. 2

219. Triglidae sp. 3 */izensis* Jordan & Starks

220. Fusa scorpionfish (Fusakasago) family sp. close to *Scorpaenana izensis*

Gobiesocida

Δ 221. Hanabinumeri (nezuppo family sp. 2)

0 222. Nezumi flathead *Callionymus valenciennesi* Temminck & Schlegel

0 223. Tobinumeri close to *Callionymus lunatus* Temminck & Schlegel ?

0 224. Setonumeri close to *Callionymus lunatus* Temminck & Schlegel ?

D 225. Hatatatenumeri (nezuppo family sp. 1) close to *Callionymus*

226. Nezuppo family sp. 1 (nezuppo family sp. 3) *lunatus* Temminck & Schlegel

Pleuronectida

227. Flounder *Paralichthys olivaceus* Temminck & Schlegel

Δ 228. Arame flatfish genus sp. ? (flounder type sp. 6) p. 1037

Δ 229. Nagadaruma flatfish sp. ? (I.C. sp. 11)

0 230. Aka flatfish *Hippoglossoides dubius* Schmidt

0 231. Uma flatfish

232. Doro flatfish

O 233. Urokome flatfish

234. Sohachi *hezensteini* Schmidt

0 235. Round-nose flounder close to *Cleisthenes pinetorum*

236. Spotted plaice *Verasper variegatus* Temminck & Schlegel

0 237. Mei flatfish (flatfish order sp.)

238. Suna flatfish

239. Right-eyed flounder *Limanda yokohamae* Günther

0 240. Tsuno flatfish

241. Numa flatfish *Platichthys stallatus* Pallas / Temminck & Schlegel

242. Ishi flatfish (*Kareus bicoloratus*) close to *Clidoderma asperrimum*

243. Yanagimushi flatfish *Tanakius kitaharai* Jordan & Starks

0 244. Hireguro close to 243.

245. Baba flatfish *Microstomus achne* Jordan & Starks

246. Setoushinoshita ? (Shimaushinoshita type sp. ? - close to 248.)

247. Shimaushinoshita

248. Tsunoushinoshita *Aesopia cornuta* Kaup

249. Inunoshita

X 250. Kuroushinoshita *Paraplagusia japonica* Temminck & Schlegel

0 251. Murasakishita flounder

252. Ushinota (tongue sole) suborder sp.1

253. Ushinota suborder sp.2
254. Ushinota suborder sp.3
255. Ushinota suborder sp.4
256. Ushinota suborder sp.5
257. Ushinota suborder sp.6
258. Ushinota suborder sp.7
259. Ushinota suborder sp.8
260. Ushinota suborder sp.9 (Shimaushinoshita - see 246. - type sp.1)
261. Ushinota suborder sp.10 (Shimaushinoshita - see 246. -type sp.3)
262. Ushinota suborder sp.11 (Shimaushinoshita - see 246. -type sp.4)

Tetraodontida p. 1038

263. Gima *Triacanthus brevirostris* Temminck & Schlegel
0 264. Kuro boxfish close to *Ostracion tuberculatus* Linné
0 265. Shima cowfish
0 266. Cowfish close to *Ostracion tuberculatus* Linné
X 267. Hama blowfish *Thinesomus concatenatus* Bloch & Schneider
Δ 268. Porcupine fish ? (boxfish suborder sp.1) *Diodon holocanthus* Linné
269. Boxfish (Hakofugu; Hakofugu = *Ostracion tiberculatus* Linné)

suborder sp.2

Unknown species I

270. Eggs resembling the eggs of akakamasu
271. Monolipid No. 17 (eggs like those of horse mackerel)
272. Monolipid No. 23 (Gingame saurel genus sp.?)
273. Monolipid No. 45 (Gingame saurel genus sp.?)
274. Monolipid No. 51 (Gingame saurel genus sp.?)
275. Sea bream type sp.1
276. Sea bream type sp.2
277. Sea bream type sp.3
278. Sea bream type sp.4
279. Sea bream type sp.5
280. Sea bream type sp.6
281 Sea bream type sp.7
0 282. Eggs resemble those of shirogisu
283. Eggs resemble those of wrasse (I.C. sp. 5)
284. Eggs resemble those of mackerel (mackerel type sp.)

285. *Parapercis pulchella* type sp.1
286 *Parapercis pulchella* type sp.2
287. *Parapercis pulchella* type sp.3
288. *Parapercis pulchella* type sp.4
289. *Parapercis pulchella* type sp.5
290. *Parapercis pulchella* type sp.6
291. *Parapercis pulchella* type sp.7
292. *Parapercis pulchella* type sp.8
293. *Parapercis pulchella* type sp.9
294. Fusa scorpionfish type sp.1
295. Fusa scorpionfish type sp.2
296. Fusa scorpionfish type sp.3 p. 1039
297. Fusa scorpionfish type sp.4
298. Fusa scorpionfish type sp.5
299. Fusa scorpionfish type sp.6
300. Fusa scorpionfish type sp.7
301. Fusa scorpionfish type sp.8
302. Fusa scorpionfish type sp.9
303. Flounder type sp. 1
304. Flounder type sp. 2
305. Flounder type sp. 3
306. Flounder type sp. 4
307. Flounder type sp. 5
308. Flounder type sp. 7
309. Flounder type sp. 8
310. Flounder type sp. 9
311. Flounder type sp.10

Unknown Species II

312. Agglutinated floating eggs sp.1
313. Agglutinated floating eggs sp.2 (frogfish order sp.?)
314. I.B sp. 1
315. I.B sp. 2
316. I.B sp. 3
317. I.B sp. 4
318. I.B sp. 5

319. I.B sp. 6
320. I.B sp. 7
321. I.B sp. 8
322. I.B sp. 9
323. I.B sp.10
324. I.B sp.11
325. I.B sp.12
326. I.B sp.13
327. I.C sp. 2
328. I.C sp. 3
329. I.C sp. 4
330. I.C sp. 8 p. 1040
331. I.C sp. 9
332. I.C sp.10
333. I.C sp.12
334. I.C sp.13
335. I.C sp.14
336. I.C sp.15
337. I.C sp.16
338. I.C sp.17
339. I.D sp.1
340. II.B sp.1
341. II.B sp.2
342. II.D sp.1 (shachi yellowtail ?)
343. III.B sp.1
344. III.C sp.1
345. III.C sp.2
346. III.C sp.3
347. III.C sp.4
348. III.C sp.5
349. III.C sp.6

(Spawning Season)

January - June (neighboring waters of Kyushu)

November - June (Pacific Ocean, sea of Japan coasts)

June - September (Inland Sea of Japan)

April - July (Inland Sea of Japan) April - May (Wakasa Bay Bay)

5. June - Jly (Ariake, Inland Sea of Japan)

almost all year round (neighboring waters of Kyushu), May - October

May - July (Korean peninsula) (Wakasa Bay Bay)

?

April - July (Southern China Sea)

10. ?

?

July - September (Suo sea)

July - September (Tateyama)

October (Tomioka)

15. September (Tomioka)

October (Todoro)

August (Todoro)

July (Todoro)

July (Todoro)

20. February (Todoro)

August (Todoro)

July - September (neighboring waters of Kyushu)

July - September (neighboring waters of Kyushu)

October (Todoro)

25. August (Todoro)

May (Todoro)

October (Todoro)

October (Todoro)

December - May (Sado)

30. Year round (Sea of Japan)

February (Todoro)

Spring, Autumn (Java) p. 1031

April - May (Meshima, Wakasa Bay Bay)
June - October (Todoro)
35. October (Todoro)
April - June, September - November (China, Pearl River mouth)
May - October (Wakasa Bay Bay)
May - October (Todoro), July - October (Wakasa Bay Bay)
August (Bungo Waterway)
40. June - July (Todoro)
May (Tomioka)
June - October (Tomioka, Wakasa Bay Bay)

May (Tamanoura)
45. June - December (neighboring waters of Kyushu)

June - September (waters south of Kyushu)
?
Spring - Autumn ?
August (26^{o} 32N, 131^{o} 57E)

50. February (Tosa)
April - June (neighboring waters of Kyushu)
January - February (Tosa)

March - April (Toyama), December - March (Hokkaido)
March (Kumano sea- Kashima sea)
55. March - April (waters off Boso - Kashima sea)
December (Todoro)
December - April (Tomioka - Tsuyazaki)

February - May (Tomioka, Todoro)

September - October (Tateyama)

60. July - August (Tateyama), August - October (Todoro) p. 1032

February - August (everywhere in Japan)

August (Tomioka)

July - September (Moji)

August - October (Sagami Bay)

65. October (Miura peninsula)

December - June (neighboring waters of Sado)

June - January (neighboring waters of Kyushu)

May - June (Kominato)

October - November (Taiwan)

70. April - May (Wakasa Bay Bay), March - May (Ariake Sea)

April - May (Wakasa Bay Bay)

June - September (Kyushu, Wakasa Bay)

November - March (Kyushu, Wakasa Bay)

September (Todoro)

75. June - July (China, Chekiang coast)

July - September (central Inland Sea of Japan)

July - August (Tamanoura)

?

25° C (Yashima Aquarium)

80. June - October (Suruga Bay)

August - November (Suruga Bay)

April - July (Southern China Sea)

May - October (Northern Kyushu, Wakasa Bay Bay)

October (Todoro)

85 May - June (China, Pohai Sea)

May - October (Wakasa Bay Bay)

September - November (Tateyama Bay)

June - August, 25-32^0 (Chesapeake Bay)

April - June (Western Kyushu)

90. April - May (Goto isles)

year round, March - May being the most active season (Northern Kyushu)

June - August (Inland sea of Japan) p. 1033

March - May (China, Pearl River mouth)

May - June (Southern China Sea)

95. ?

June - August (neighboring waters of Kyushu)

May - July (Northern Kyushu)

July - August (Todoro)

April - June (Tosa Bay)

100. May - August (Ariake Sea)

June - July (Fukuoka)

February - April (Nobeoka)

June (neighboring waters of Korea)

April - June (neighboring waters of Korea)

105. May - June (neighboring waters of Korea)

June - July (neighboring waters of Korea)

May - December (Todoro)

September - November (Toyama), August - October (Wakasa Bay Bay)

?

110. November - June (neighboring waters of Kyushu), April - May (Wakasa Bay)

May (Mejima)

24 - 25^o C (Yashima aquarium)

April - May (China, Pearl River mouth)

March - July (southern China sea)

115. August 22 - 25^o C (Tokai University aquarium)

April, 26^o C (China, Pearl River mouth)

June - July (northern Kyushu)

May - July (neighboring waters of Yamaguchi)

July - August (Oita)

120. May - August, 20 - 27^0 C (Tokai University aquarium)

?

March - April (China, Fukien coastal waters), April - May (China, north

June (Tamanoura) of Southern Sea)

July (neigboring waters of Nagasaki)

125. June - November (neighboring waters of the Goto isles)

October - December (Kitakyushu)

March - May (neighboring waters of Kitakyushu), April - May (Wakasa Bay)

April - June (Tottori) p. 1034

March - June (Kyushu), April - June (Wakasa Bay Bay)

130. October - November (coast of Kyushu)

July (Wakayama)

May, 22.6 - 25^0 C (Taiwan)

June - August (Tamanoura)

23^0 C (Tokai university aquarium)

135. July - September (Yamaguchi Prefecture, Tsunoshima)

24 - 28^o C (Tokai University aquarium)

25 - 26^o C (same as above)

21 - 27^o C (same as above)

May - July (neighboring waters of Kyushu), August (Wakasa Bay Bay)

140. June (neighboring waters of Kyushu)

July, 26^o C (Tokai University aquarium)

August, 28^o C (Tokai University aquarium)

October - December (Tomioka, Todoro)

June - July (Tomioka, Todoro)

145. June - July (neighboring waters of Kyushu), August (Gobo)

October (Wakasa Bay Bay coast)

September - December (Kitakyushu, Wakasa Bay Bay)

August (Tomioka, Shimonoseki)

August (Kominato)

150. July (Goto, Tamanoura)

November, 20 - 26^0 C (Tokai University aquarium)

August - September (Tamanoura, Todoro)

June - November (Tateyama Bay)

June - August (Tomioka), May - September (Wakasa Bay Bay)

155. June - September (Tateyama Bay)

April - October (neighboring waters of Kyushu)

December - March (Todoro)

June - October (Tomioka)

September - October (Todoro)

160. August (Tamanoura)

September (Tomioka) p. 1035

April (Mejima)

August - September (Todoro)

July (Todoro)

165. May (Todoro)

October (Tomioka)

May (Tamanoura)

June (Todoro)

July (Todoro)

170. August (Todoro)

Height of summer - early fall (Tateyama Bay)

October - February (neighboring waters of Kyushu)

December (Todoro)

June - August, September - December, 27.5 - 30.5^0 C (Oita aquarium)

175. ?

February - August (Northern Pacific, medium latitude)

April - July (neighboring waters of Kyushu)

May (neighboring waters of Kyushu)

April - June (Eastern Inland Sea of Japan)

180. ?

?

June - August (Tateyama Bay)

May - July (Kushimoto)

June - September (Bungo, Kii waterways)

185. July (Tateyama Bay)

June - September (Bungo waterway and other places)

June - July (Kumano sea)

June - August (neighboring waters of the Marshall archipelago)
Year round (southern part of North Pacific)
190. May - June (Oki isles)
August - October (neighboring waters of Kyushu)
June - August (sea area off southern China)
May (Todoro)
?
195. ?
?
?
?
?
200. July - August (central Inland Sea of Japan)
March - June (neighboring waters of Kyushu)
June - October (Todoro, Wakasa Bay Bay)
24° C (Hawai)

April - May (Megumiyama, Erimo sea area)
205. August - September (Tomioka, Tamanoura)
June - July (Fukuoka)
August - September (Wakasa Bay Bay)
May - August (Tomioka, Wakasa Bay)
April - July (neighboring waters of Kyushu)
210. April - May (northern China South Sea)
December - April (neighboring waters of Kyushu)
December - April (same as above)
September (Nagasaki)
Winter (Kyushu)
215 Winter (Kyushu)
February - June (Inland Sea of Japan)
October - December (Tomioka, Todoro)
December - February (Tomioka), May (Meshima)
December - March (Tomioka)
220. May (Misaki)

July - August (Kyushu)

May (Omura Bay)

September - December (western Inland Sea of Japan)

May (Omura Bay)

225. May (Omura Bay)

October (Tomioka)

January - May (neighboring waters of Kyushu), March - May (Wakasa Bay)

October (Wakasa Bay coast) p. 1037

August (Tomioka, Wakasa Bay)

230. February - March (Sea of Japan off Honshu)

?

March - April (Hokkaido, Takajima)

August - September (Chijima, Sakhalin)

February - March (waters off Hamada)

235. January - March (Yamaguchi - Shimane Prefectures, Wakasa Bay)

February (Tomioka)

November - January (Kyushu), December - March, May ? (Wakasa Bay)

May - June (Hokkaido, Takajima)

February - March (Wakasa Bay)

240. April (western Kamchatka coast)

February - March (Ishikari Bay), March (neighboring waters of Noto)

February - March (Wakasa Bay)

January - March (Wakasa Bay)

June - July (Hokkaido, Takajima)

245. February - March (Erimosaki)

March - May (Tomioka), April - May (Wakasa Bay)

June (China, Tsingtao)

June (Todoro)

June - August (Moji)

250. August - September (neighboring waters of Fukujima)

March - April (waters off Shimabara)

June (Tomioka)

October (Todoro)
June - August (Todoro)
255. September - October (Tomioka, Todoro)
August - October (Todoro)
September - October (Todoro)
September - October (Tomioka)
June (Tomioka)
260. June (Todoro)
September (Tomioka)
August - October (Tomioka)

June - July (Mikawa Bay) p. 1038
June - August (Miyakejima)
265. June - August (Miyakejima)
June - August (Miyakejima)
July (Tamanoura)
May - August (neighboring waters of Kyushu)
May - August (neighboring waters of Kyushu)

270. August (Todoro)
April - July (Tateyama Bay)
September (Tateyama Bay)
July - August (Tateyama Bay)
August (Tateyama Bay)
275. May (Tamanoura)
April - May (Todoro)
April (Todoro)
October (Todoro)
June - August (Tomioka)
280. May - August (Todoro)
May - July (Todoro)
July - August (Wakasa Bay)
April - June (Todoro, Wakasa Bay)
December (Tsuyazaki)

285. July (Tomioka)
February (Tomioka)
July (Tomioka)
May - September (Tomioka, Todoro)
July - September (Todoro)
290. June - September (Tomioka)
June - September (Tomioka)
June - October (Tomioka, Todoro)
May - September (Tomioka, Tamanoura)
May - June (Todoro)
295. June - August (Tomioka)
August - October (Tomioka)
May (Tsuyazaki)
June - October (Todoro, Tsuyazaki)
October (Tomioka)
300. September - October (Tomioka, Todoro)
June (Todoro)
June - October (Tomioka, Todoro)
May - July (Tomioka)
May (Tomioka)
305. February (Tomioka)
June (Todoro)
August (Todoro)
May (Tomioka)
June (Todoro)
310. October (Tomioka, Wakasa Bay)
June (Todoro)

p. 1039

July (Tamanoura)
May - June (Todoro)
October (Tomioka, Todoro)
315. July (Todoro)
February (Todoro)
August - September (Tomioka)
July (Tomioka)

December (Todoro)

320. July (Todoro)

June (Todoro)

June - July (Todoro)

September (Todoro)

July - August (Tomioka, Todoro)

325. October (Todoro)

October (Tomioka)

June (Todoro)

August (Todoro)

August (Todoro)

330. August (Tomioka)

p. 1040

June (Todoro)

July (Todoro)

May - June (Todoro)

April (Todoro)

335. June (Tomioka)

August (Tomioka)

June (Todoro)

June (Todoro)

August (Todoro)

340. June (Todoro)

December (Todoro)

June (Todoro)

July - October (Todoro)

September - October (Tomioka)

345. June (Todoro)

August (Tomioka)

July - August (Tomioka, Todoro)

June - December (Tomioka, Todoro)

May - July (Todoro)

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